U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE/NOAA FISHERIES

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CRUISE REPORT[1]

VESSEL: *Oscar Elton Sette*, Cruise 05-02 (Fig. 1)

CRUISE PERIOD: 24 February−6 March 2005

AREA OF OPERATION: Main Hawaiian Islands

TYPE OF OPERATION: Personnel from the Coral Reef Ecosystem Division, Pacific Islands Fisheries Science Center, National Marine Fisheries Service (NMFS), NOAA, and the Division of Aquatic Resources, Department of Land and Natural Resources, State of Hawaii, conducted reef assessment/monitoring and mapping studies in waters surrounding the Main Hawaiian Islands of Maui and Hawaii.

ITINERARY:

24 February — Start of cruise. Embarked Rusty Brainard (towboard/habitat), Molly Timmers (towboard/habitat), Dwayne Meadows (towboard/habitat), Casey Wilkinson (towboard/habitat), Brian Zgliczynski (towboard/fish), Joe Laughlin (towboard/fish), Stephani Holzwarth (towboard/fish), Ben Richards (towboard/fish), Steve Cotton (fish), Paul Murakawa (fish), Darla White (fish), Greta Aeby (coral), Dave Gulko (coral), Ranya Henson (algae), Ryan Okano (algae), Scott Godwin (invertebrates), Kyle Hogrefe (oceanography), Oliver Dameron (data manager), Marc Lammers (bioacoustics), and Jake Asher (Divemaster). Conducted dive accident management drill and safety meeting. Departed Snug Harbor at 1030 to commence cruise. Conducted scientific indoctrination meeting, fire and abandon ship drills, and small boat/dive safety meeting. Arrived off Barber's Point channel at 1400 to commence launching small boats. Conducted one fish and benthic Rapid Ecological Assessment (REA) survey and four fish and benthic towed-diver surveys of impact region of the grounding of the M/V *Cape Flattery*. Departed Barber's Point survey area at 1730 en route to Maui.

[1] PIFSC Cruise Report CR-06-007
Issued 31 May 2006

25 February — Arrived off Hana, Maui at 0700. Conducted small boat/dive safety meeting at 0730. Conducted two fish and benthic REA surveys in north Hana Bay and west of Keanae Point in Nuaaihua Bay, respectively. Conducted five fish and five benthic towed-diver surveys and intercomparisons along the forereef habitats of the northeast coast of Maui from Hana Bay to Makaiwa Bay. Conducted 10 shallow water conductivity-temperature-depths (CTDs) along the same coastline from Hana Bay to Waipio Bay. Conducted two daytime and nine nighttime bioacoustic transects around a replicate box grid consisting of transects parallel and oblique to shore. Conducted one Isaacs-Kidd midwater trawl (IKMT) through dense scattering layers observed bioacoustically. Attempted one deepwater CTD, but experienced electronic problems with the CTD fish.

26 February — Because of moderately high winds off Hana at 0600, the ship transited west along the southeast Maui coast to find more shelter for small boat and diving operations. Conducted small boat/dive safety meeting at 0730. Launched boats in sheltered area off Nuu Bay and conducted one fish and benthic REA survey. Conducted two fish and two benthic towed-diver surveys and intercomparisons along the forereef habitats of Waiu Bay, Nuu Bay, and Huakini Bay. By 1100, winds significantly increased in strength to 45 knots and shifted in direction to eliminate most of the protection afforded for small boat and diving operations. As such, all survey operations were aborted. The two towed-diver survey teams transited ~13 nmi downwind/sea to La Perouse Bay for eventual recovery by the *Oscar Elton Sette* at 1400. The two REA survey boats remained at anchor in the protected shelter of Nuu Bay until the ship recovered them at 1700. Conducted 12 bioacoustic transects consisting of three replicate survey grids parallel and oblique to shore. Departed Maui at 2300 en route to Hilo Bay.

27 February — Arrived in Hilo Bay, Hawaii at 0700. Conducted small boat/dive safety meeting at 0730. Conducted three fish and benthic REA surveys in Onomea Bay, near Pepeekeo Point, and in Pohakumanu Bay, respectively. Conducted five fish and five benthic towed-diver surveys and intercomparisons along the forereef habitats of the Hamakua coast of Hawaii from Onomea Bay to near Lapahoehoe Point. Conducted 12 shallow water CTDs along the same coastline from south of Hilo and along Hamakua coast. Conducted test of CTD cast to 260 m. Conducted twelve bioacoustic transects consisting of three replicate survey grids parallel and oblique to shore. High wind and sea conditions did not allow planned IKMT operations. Conducted two deepwater CTDs off Pauhau and Honokaa.

28 February — Evaluated conditions at planned reef assessment sites off the northeast coast of Hawaii at 0600 and determined weather and sea conditions would not allow planned surveys in that area. Transited to area off Mahukona for safer operating conditions. Conducted small boat/dive safety meeting at

0730. Conducted three fish and benthic REA surveys between Holana Bay and Mahukona Harbor. Conducted five fish and five benthic towed-diver surveys and four intercomparisons along the forereef habitats of the North Kohala coast of Hawaii from Umiwai Bay to near Keawanui Bay. Conducted five shallow water CTDs along the same coastline from Holana Bay to Keawanui Bay. Deployed SBE-39 Subsurface Temperature Recorder (STR) #3936859-1668 in 11 m of water at position 20˚ 11.467'N, 155˚ 54.210'W. Conducted seven bioacoustic transects consisting of transects parallel and oblique to shore off Mahukona. Departed Mahukona area en route to Cape Kumakahi at 1915.

1 March — Arrived off Cape Kumakahi at 0600. Conducted small boat/dive safety meeting at 0730. Conducted three fish and benthic REA surveys off the Puna coast between Kapoho Bay and Volcanoes National Park. Conducted six fish and benthic towed-diver surveys and intercomparisons along the forereef habitats of the Puna coast between Cape Kumakahi and Volcanoes National Park. Conducted nine shallow water CTDs along the same coastline from Cape Kumakahi to near Volcanoes National Park. Deployed SBE-39 Subsurface Temperature Recorder (STR) #3936859-1660 in 11 m of water at position 19˚ 29.182'N, 154˚ 49.056'W off Waiopea Tide Pools. Conducted ten bioacoustic transects, two daytime and eight nighttime, parallel and oblique to shore off Volcanoes National Park and active lava flow into the ocean. Conducted one IKMT within the bioacoustic survey grid. Conducted one deepwater CTD to 500 m.

2 March — Conducted small boat/dive safety meeting at 0730. Conducted two fish and benthic REA surveys off Volcanoes National Park south of the active lava flows. Conducted four fish and benthic towed-diver surveys and intercomparisons along the forereef habitats of Volcanoes National Park. Conducted six shallow water CTDs along the same coastline along Volcanoes National Park. All diving operations were aborted at 1430 when the ship received a notice from the NOAA Dive Center to immediately cancel all diving operations utilizing Scubapro Mk 20 regulators first stages. Coincidentally with the diver recall, weather/sea conditions deteriorated in the afternoon with sustained winds of 25-30 knots onshore. Conducted eight bioacoustic transects consisting of replicate box grids parallel and oblique to shore off an area west of Ka Lae (South Point). Conducted one IKMT within the bioacoustic survey grid. Conducted one deepwater CTD to 500 m.

3 March — Conducted small boat/dive safety meeting at 0730. Conducted three fish and benthic REA surveys in the vicinity of Ka Lae, one on the east side in Kaalualu Bay, one just east of Ka Lae. Conducted six fish and benthic towed-diver surveys and intercomparisons along the forereef habitats of the east (three) and west (three) sides of Ka Lae from Kaiole Bay to near Keliuli Bay. Conducted eight shallow water CTDs along the same coastline in the vicinity of Ka Lae. Deployed SBE-39 Subsurface Temperature Recorder (STR) #3936859-1654 in 14 m of water at position

	18˚ 55.350'N, 155˚ 41.059'W. Conducted two replicate bioacoustic survey grids consisting of transects parallel to shore and normal to shore off an area west of South Point. Conducted one IKMT within the bioacoustic survey grid. Conducted one deepwater CTD to 500 m.
4 March	Conducted small boat/dive safety meeting at 0730. Conducted three fish and benthic REA surveys along the southeast coast of Hawaii off Kamekame Hill, at Punaluu Bay, and at Honoapu Bay, respectively. Conducted six fish and benthic towed diver surveys and intercomparisons along the forereef habitats from Volcanoes National Park south to Waikapuna Bay. Conducted six shallow water CTDs along the southeast Hawaii coast. Deployed SBE-39 Subsurface Temperature Recorder (STR) #3936859-1655 in 13 m of water at position 19˚ 07.975'N, 155˚ 30.132'W. Conducted 10 bioacoustic transects, two daytime and eight nighttime, consisting of a box grid parallel and oblique to shore off an area south of Ka Lae. Conducted an IKMT within the bioacoustic survey grid. Conducted one deepwater CTD off South Point.
5 March	Conducted small boat/dive safety meeting at 0730. Conducted two fish and benthic REA surveys along the northwest Puna coast of Hawaii off Makaukia Point and off Haena, respectively. Conducted four fish and benthic towed-diver surveys and intercomparisons along the forereef habitats along the coast from Cape Kumakahi to near the entrance to Hilo Bay. Conducted seven shallow water CTDs. All boats were on board at 1500 to conclude operations for the cruise and begin the transit back to Honolulu.
6 March	Arrived at Honolulu sea buoy at 1100 and moored at Snug Harbor at 1130 to end cruise. Disembarked all scientific staff.

CRUISE STATISTICS:

Table 1: Cruise statistics for the Main Hawaiian Islands.

	NE Maui	East Maui	Windward Hawaii	Southeast Hawaii	Northwest Hawaii	Southwest Hawaii	Barber's Point, Oahu	**Totals**
Towed-diver habitat surveys	5	2	9	19	5	3	4	47
Towed-diver fish surveys	5	2	9	19	5	3	4	47
Fish rapid ecological assessments	2	1	5	9	3	2	1	23
Benthic rapid ecological assessments	2	1	5	9	3	2	1	23
STR deployed				2	1	1		4
Deepwater CTDs								7
Shallow water CTDs	10	0	19	25	5	4		63
SCUBA dives								
Bioacoustic transects	11	12	12	35	7			77
IKMT trawls	1			5				6

MISSIONS AND RESULTS:

A. Established quantitative methods were used to estimate numerical abundance and fish species richness. Site selection was determined through discussions with Division of Aquatic Resources personnel pertaining to biodiversity and human impact concerns and modified as necessary based on local weather and sea conditions. Three sites per day were preselected and spaced to allow survey completion within operational parameters set by the *Oscar Elton Sette* (Appendix A).

A ship grounding site at Barber's Point, Oahu was surveyed on the day of departure. Two sites were surveyed on the northeast coast of Maui while weather and sea conditions permitted only one survey to be performed on Maui's south coast. Nineteen sites were surveyed on the Island of Hawaii including three on the northwest coast, three on the northeast coast, ten on the southeast coast and three on the south coast.

1. Large apex predators such as sharks and jacks were rarely encountered. Only two sharks and one large jack were observed among all sites. Several small jacks (30-40 cm) were observed in total. This is in marked contrast to the Northwestern Hawaiian Islands where large apex predators are common. The most commonly observed predators at most of the Main Hawaiian Island (MHI) sites were smaller snappers such as *Aphareus furca* and *Lutjanus kasmira* and the grouper *Cephalopholis argus*. Fish assemblages were numerically dominated by acanthurids, pomacentrids, and chaetodontids.

B. Conducted surveys to document the species composition, relative abundance, percent cover, size distribution, and general condition in the MHI (Appendix B).

C. Used quantitative photoquadrat sampling method to collect species composition and baseline abundance data of reef algae in the MHI (Appendix C).

D. The non-coral marine invertebrate fauna of coral reefs represents a group of animals that are numerically dominant in their habitat and, in some cases, represent taxonomic groups that are only represented in the marine environment. This group of organisms is surveyed and monitored for the purpose of identifying changes to reef communities. This is accomplished through procedures that quantify a set of target organisms and which also gradually builds an inventory of species to document biodiversity. Macroinvertebrate surveys were conducted to record species composition and abundance in the Main Hawaiian Islands in order to establish baseline data to monitor non-coral invertebrate fauna of each reef system (Appendix D).

E. Used benthic and fish towed-diver survey methods at three MHI to provide a general description of reef habitat, invertebrates, and reef fishes over a large spatial scale. The methods provided assessments and the foundation for monitoring large-scale disturbances and the general distribution and abundance patterns of macroinvertebrates and reef fishes over 50 cm total length (TL) (Appendix E).

1. A total of 47 towed-diver surveys were conducted totaling approximately 110 linear km of habitat.

Fish Observations:

The redlip parrotfish (*Scarus rubroviolaceus)* and the spectacled parrotfish (*Chlorurus perspicillatus*) were the most commonly observed fish larger than 50 cm TLat all islands. Surveys were conducted along multiple habitats and *S. rubroviolaceus* and *C. perspicillatus* dominated most of the surveys regardless of habitat. Preliminary quantitative results yielded low predator densities (> 50 cm TL) at all island locations during the survey period. Only one whitetip reef shark (*Triaenodon obesus*) and four giant trevally (*Caranx ignobilis*) were observed during the surveys. Although the most commonly observed jack species (Carangidae) was the bluefin trevally (*Caranx melampygus*), most individuals observed were smaller that 50 cm TL.

The finescale triggerfish (*Balistes polylepis*), which is common in the tropical eastern Pacific but thought to be rare in Hawaii, was frequently observed along the south and southeast coasts of Hawaii. Other notable observations included multiple sightings of the spotted knifejaw (*Oplegnathus punctatus*) and a single sighting of a tiger shark (*Galeocerdo cuvier*).

Hawaiian green sea turtles (*Chelonia mydas*) were observed during many surveys and were especially abundant along the southeast coasts of Hawaii. Four hawksbill turtles (*Eretmochelys imbricata*) were observed along the southeast coast of the Island of Hawaii.

Benthic Observations:

The average hard coral cover was relatively high (10 to 20%), with a range of 0-70%. The highest coral cover percentages were found at southwest Hawaii and southeast Hawaii, and the lowest live coral cover percentages were found at east Maui (1-5%). This low cover was a result of one out of the two tows being almost entirely over sand. Stressed hard coral, defined as pale or white in coloration as a result of predation, bleaching, disease, and/or physical damage, was low in all regions and was made up of less than 5% of the colonies. Stressed hard coral in the southwest region of Hawaii appeared to be stressed because of predation by the Crown-of-thorns starfish (COTS), *Ancanthaster planci*. This starfish was most abundant in this region. Nevertheless, crown-of-thorns numbers were low and not near outbreak levels. Sand and rubble did not vary among regions. Northwest Hawaii had the lowest cover of macroalgae while northeast Maui and Oahu had the greatest cover of macroalgae. Northwest Hawaii had the greatest number of observed urchins while northeast Maui had the lowest number of observed urchins. Coralline algae were found in similar percentages throughout each region (5-10%). Sea cucumber numbers were low in east Maui and Oahu. Soft coral was detected in low amounts in northeast Maui. Large *Porites* heads were seen in southwest and southeast Hawaii. Wire coral was observed in east Maui and southeast Hawaii and nets and fishing line were observed in southwest and southeast Hawaii. Overall, Oahu and east Maui had a low complexity inherent in its habitats. Although data was not collected on the following information, it may be interesting to note that divers observed Zooanthids frequently

in southeast Hawaii and that most of the substrate along the tows was predominantly basalt boulder.

F. The Oceanography Team deployed seasurface temperature recorders and conducted shallow water CTD casts to quantify and assess the hydrographic environment in the MHI (Appendix F).

G. Goals for night operations during OES0502 included shipboard CTD casts and EK60 echosounder transects and associated IKMT plankton net trawls (Appendix G).

SCIENTIFIC PERSONNEL:

Russell Brainard, Ph.D., Chief Scientist, Towboard Team - Habitat, National Oceanic and Atmospheric Administration (NOAA)-Pacific Islands Fisheries Science Center (PIFSC)-Coral Reef Ecosystems Division (CRED)
Molly Timmers, Towboard Team – Habitat, University of Hawaii (UH)-Joint Institute for Marine and Atmospheric Research (JIMAR), PIFSC-CRED
Casey Wilkinson, Towboard Team – Habitat, UH-JIMAR, PIFSC-CRED
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Brian Zgliczynski, Towboard Team – Fish, NOAA-PIFSC-CRED
Joseph Laughlin, Towboard Team – Fish, UH-JIMAR, PIFSC-CRED
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Benjamin Richards, Towboard Team – Fish, UH-Zoology (JIMAR, PIFSC-CRED)
Scott Godwin, Benthic Team – Invertebrates, Bishop Museum
Ryan Okano, Benthic Team – Algae, Hawaii Department of Land and Natural Resources (DLNR)-Division of Aquatic Resources (DAR)
Ranya Henson, Benthic Team – Algae, Bishop Museum
David Gulko, Benthic Team – Corals, Hawaii DLNR-DAR
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Jacob Asher, Divemaster, UH-JIMAR, PIFSC-CRED

DATA COLLECTED:

Digital images of diseased coral
Field notes on signs of coral bleaching or disease
Samples of diseased coral for histopathological analysis
Digital images from algal photoquadrats
Algal voucher specimens
Algal field notes of species diversity and relative abundance
Digital images of the benthic habitat from towboard surveys
Macroinvertebrate counts from towboard surveys
Quantitative surveys of reef fishes (larger than 50 cm TL) to species level from towboards

Habitat lineation from towboard surveys
Benthic composition estimations from towboard surveys
Acoustic Doppler current profiler (ADCP) transects
Conductivity, temperature and depth (CTD) profiles to 500 m

(/s/Russell E. Brainard)
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Attachments

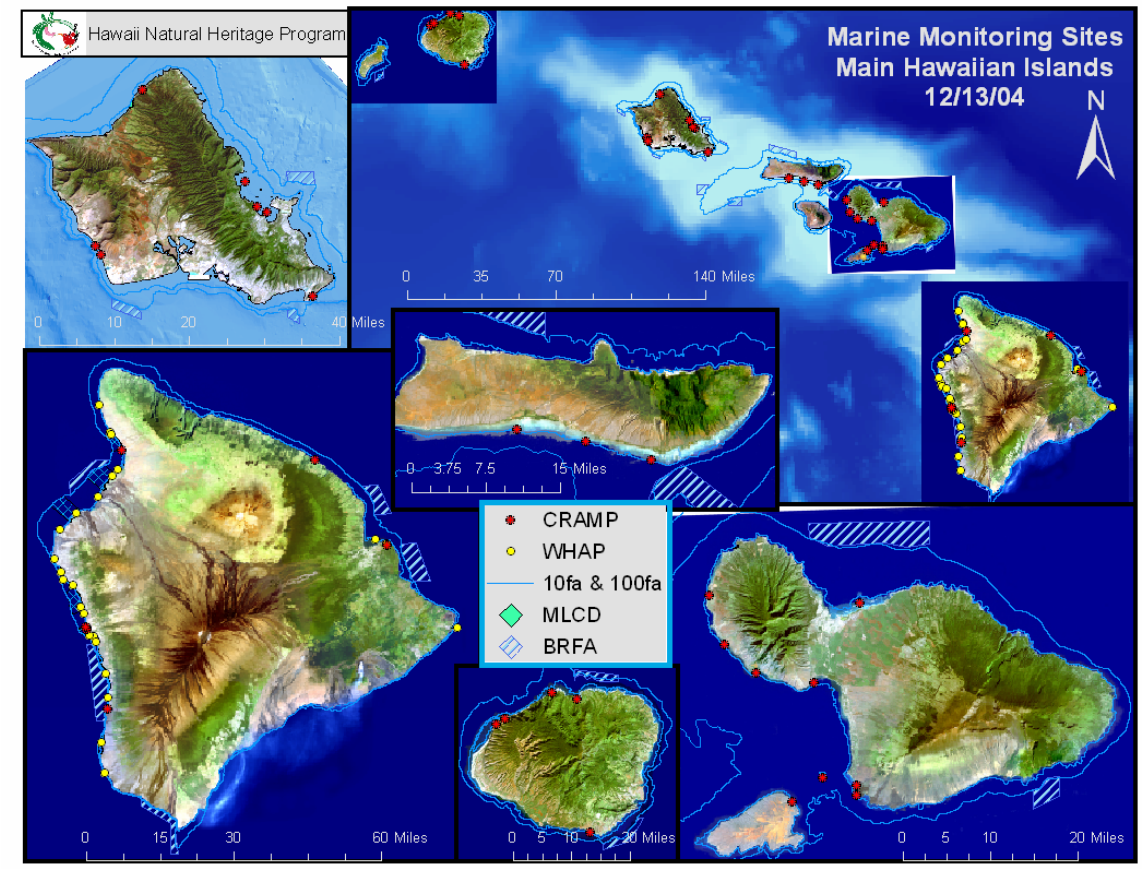

Fig.1. Maps of existing survey sites in the Main Hawaiian Islands. Proposed surveys for OES-05-02 will be windward sides of Hawaii and Maui.